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(54) **HUMAN-MACHINE INTERFACE HAVING MULTIPLE TOUCH TREND MANIPULATION CAPABILITIES**

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(51) **Int. Cl.**

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G06F 3/0481	(2013.01)
G06F 3/0488	(2013.01)
G06F 3/048	(2013.01)
G06F 17/30	(2006.01)

(52) **U.S. Cl.**

CPC ***G06F 3/04883*** (2013.01); ***G06T 11/203*** (2013.01); ***G06T 11/206*** (2013.01); *G06F 3/048* (2013.01); *G06F 3/0488* (2013.01); *G06F 17/30994* (2013.01)

(58) **Field of Classification Search**

CPC . G06F 3/048; G06F 3/04881; G06F 3/04883; G06F 3/04887; G06F 3/04888; G06F 17/30994; G06T 11/206; G06T 11/203

USPC 345/440–442, 660–661; 715/833–856

See application file for complete search history.

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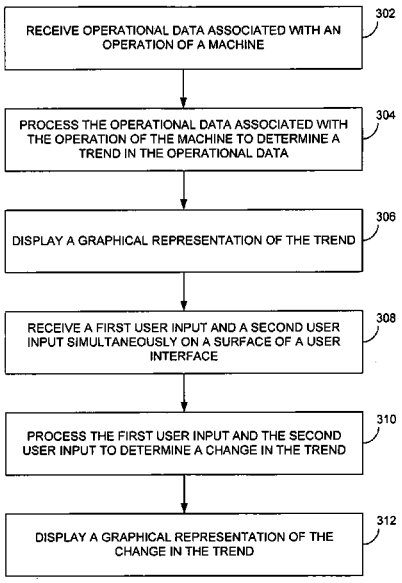
(57) **ABSTRACT**

A Human-Machine Interface (HMI) system comprises a machine interface, a processing system, and a user interface. The machine interface receives operational data associated with an operation of a machine. The processing system processes the operational data associated with the operation of the machine to determine a trend in the operational data. The user interface displays a graphical representation of the trend, and receives a first user input and a second user input simultaneously on a surface of the user interface. The processing system processes the first user input and the second user input to determine a change in the trend. The user interface displays a graphical representation of the change in the trend.

20 Claims, 7 Drawing Sheets



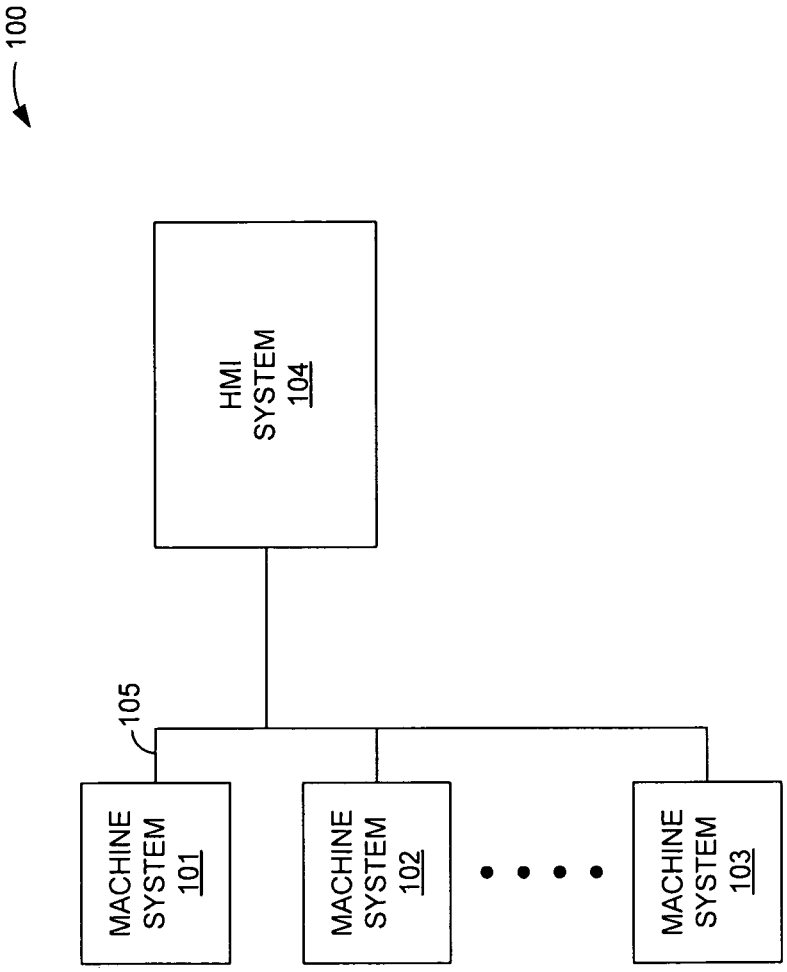

100
HMI SYSTEM 104
105
MACHINE SYSTEM 101
MACHINE SYSTEM 102
MACHINE SYSTEM 103

FIGURE 1

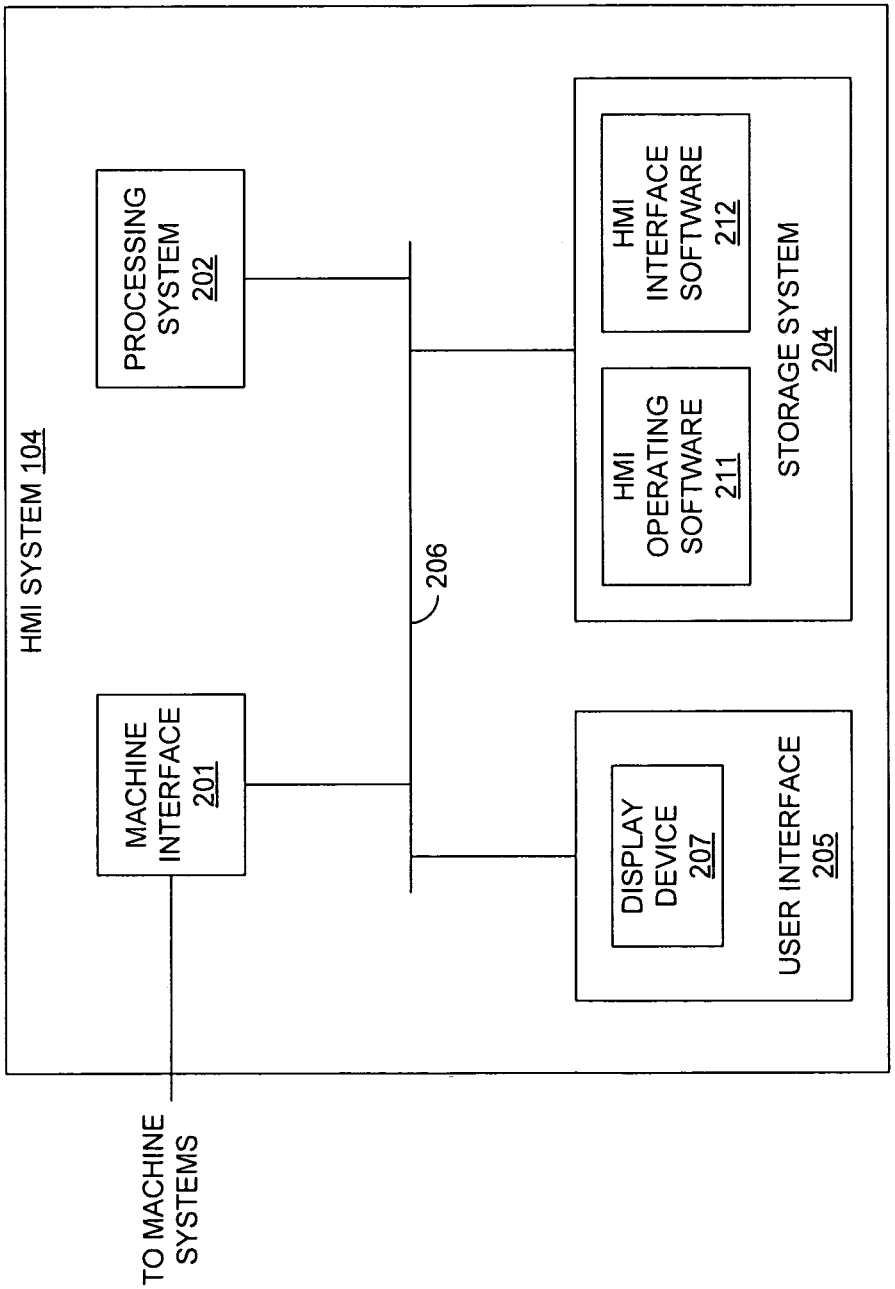

HMI SYSTEM 104
PROCESSING SYSTEM 202
MACHINE INTERFACE 201
206
HMI INTERFACE SOFTWARE 212
HMI OPERATING SOFTWARE 211
STORAGE SYSTEM 204
DISPLAY DEVICE 207
USER INTERFACE 205
TO MACHINE SYSTEMS

FIGURE 2

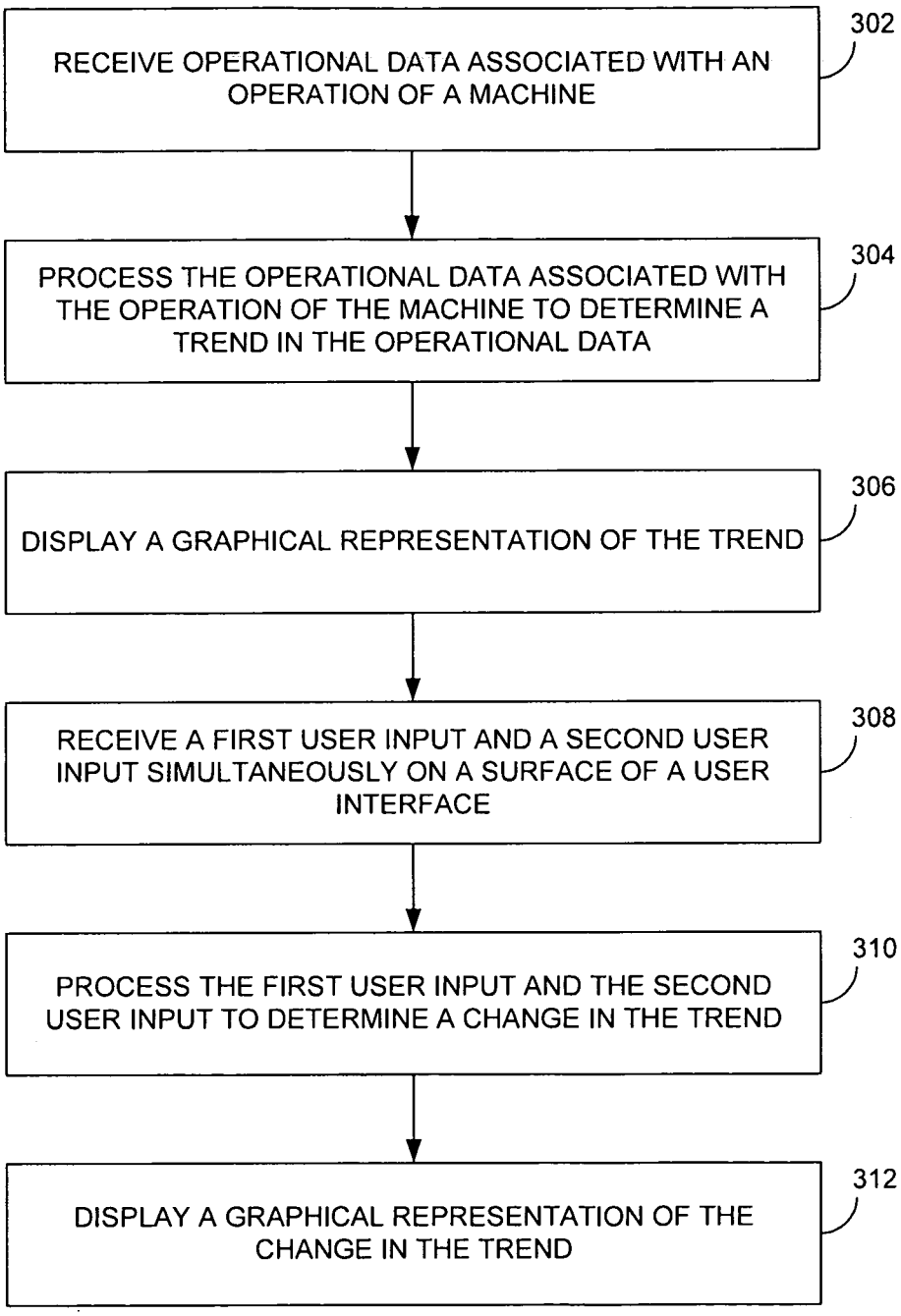

RECEIVE OPERATIONAL DATA ASSOCIATED WITH AN OPERATION OF A MACHINE
302
PROCESS THE OPERATIONAL DATA ASSOCIATED WITH THE OPERATION OF THE MACHINE TO DETERMINE A TREND IN THE OPERATIONAL DATA
304
DISPLAY A GRAPHICAL REPRESENTATION OF THE TREND
306
RECEIVE A FIRST USER INPUT AND A SECOND USER INPUT SIMULTANEOUSLY ON A SURFACE OF A USER INTERFACE
308
PROCESS THE FIRST USER INPUT AND THE SECOND USER INPUT TO DETERMINE A CHANGE IN THE TREND
310
DISPLAY A GRAPHICAL REPRESENTATION OF THE CHANGE IN THE TREND
312

FIGURE 3

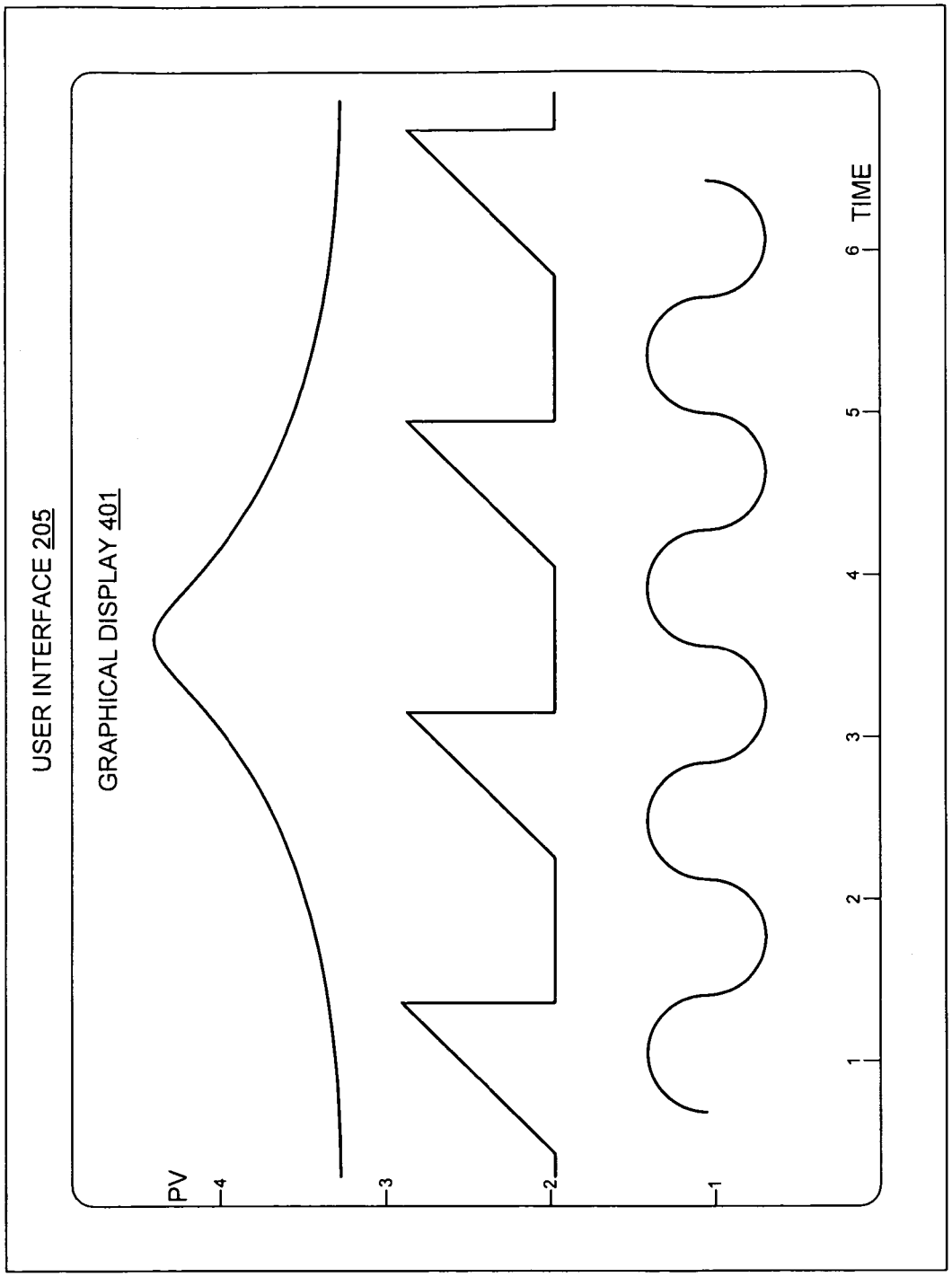

USER INTERFACE 205
GRAPHICAL DISPLAY 401
PV
4
3
2
1
1
2
3
4
5
6
TIME

FIGURE 4

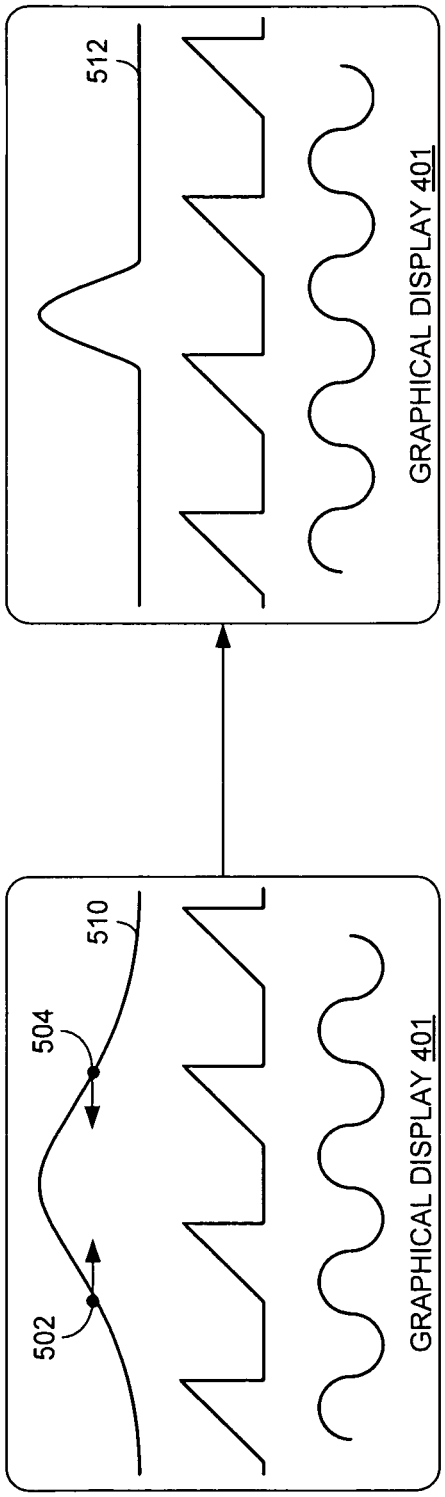

512
GRAPHICAL DISPLAY 401
510
504
502
GRAPHICAL DISPLAY 401

FIGURE 5

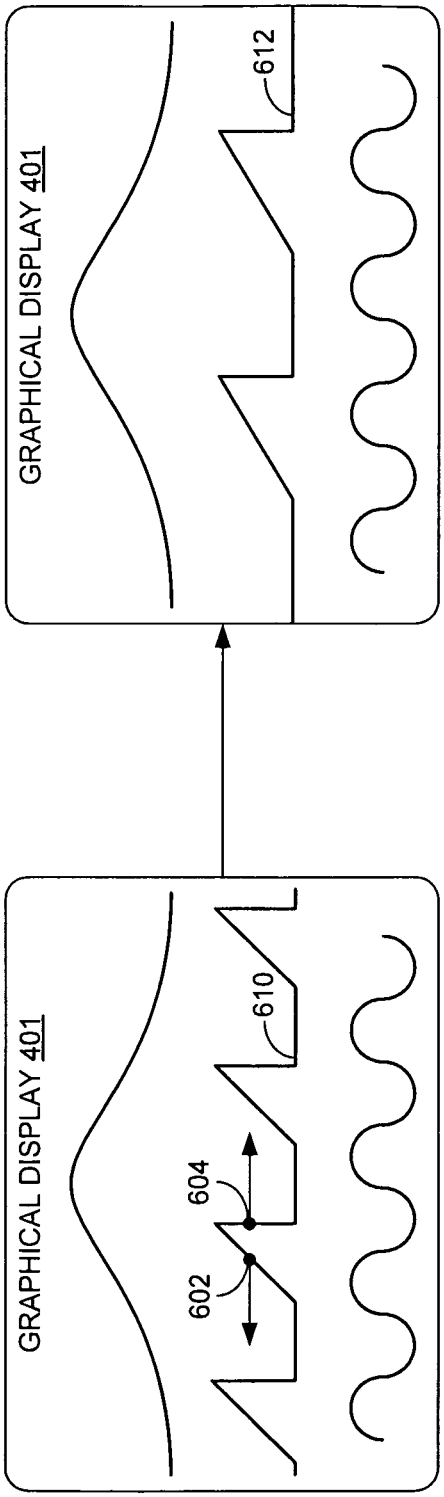

GRAPHICAL DISPLAY 401
612
GRAPHICAL DISPLAY 401
610
604
602

FIGURE 6

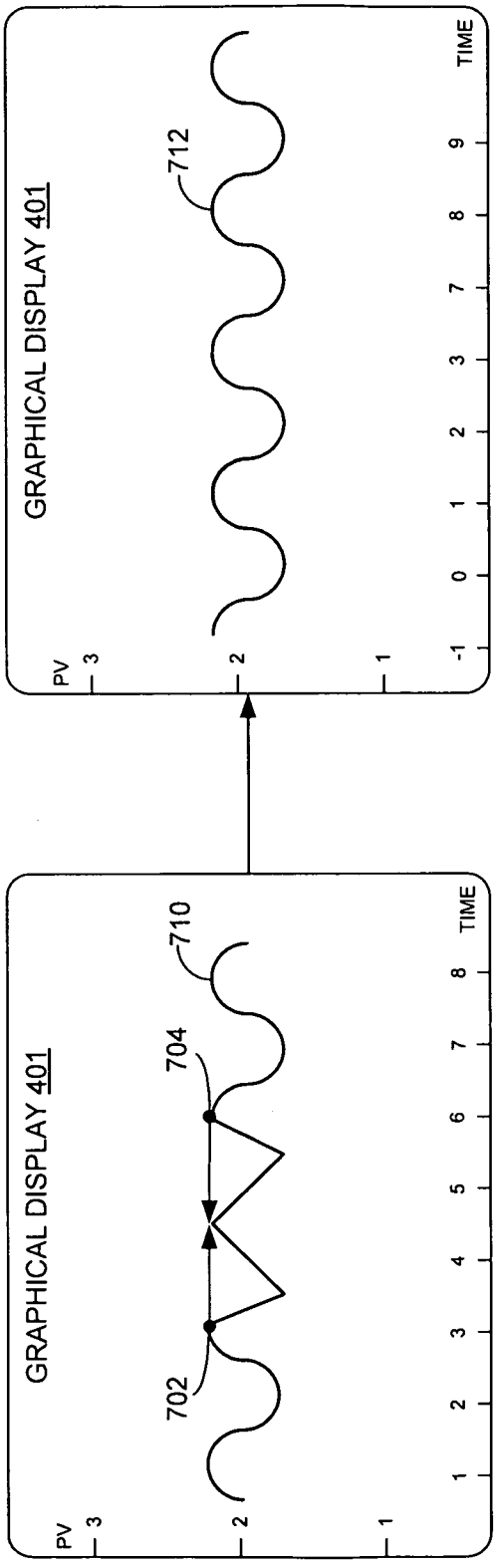

GRAPHICAL DISPLAY 401
PV
3
2
1
TIME
1
2
3
4
5
6
7
8
702
704
710
GRAPHICAL DISPLAY 401
PV
3
2
1
TIME
-1
0
1
2
3
7
8
9
712

FIGURE 7

HUMAN-MACHINE INTERFACE HAVING MULTIPLE TOUCH TREND MANIPULATION CAPABILITIES

TECHNICAL FIELD

The invention is related to the field of human-machine interfaces, and in particular, to a system that displays graphical representations of changes in trend data that are generated by a human-machine interface.

TECHNICAL BACKGROUND

Industrial environments include automobile manufacturing factories, food processing plants, and microprocessor fabrication facilities. The typical industrial environment includes various machines, such as pumps, motors, and robots. These machines continually produce data that indicates the current status of the machines, such as the machine's pressure, temperature, or speed.

The typical industrial environment also includes a Human-Machine Interface (HMI). The HMI receives and processes the status data from the machines to generate various graphical displays. The graphical displays indicate the current and historical status of the machines. For example, an HMI graphical display might indicate the pressure of a pump, the speed of a motor, or the output of a robot. The HMI may also control the machines. For example, the HMI might turn on a pump, speed-up a motor, or stop a robot.

The HMI may allow a user to manipulate various graphical displays. Unfortunately, the user must operate traditional input devices such as a keyboard and mouse to cause a desired alteration of a graphical display. This method of image manipulation may be too slow, inefficient, or cumbersome for some users.

TECHNICAL SUMMARY

A Human-Machine Interface (HMI) system comprises a machine interface, a processing system, and a user interface. The machine interface receives operational data associated with an operation of a machine. The processing system processes the operational data associated with the operation of the machine to determine a trend in the operational data. The user interface displays a graphical representation of the trend, and receives a first user input and a second user input simultaneously on a surface of the user interface. The processing system processes the first user input and the second user input to determine a change in the trend. The user interface displays a graphical representation of the change in the trend.

In some examples, the user interface is configured to display the graphical representation of the change in the trend by expanding the graphical representation of the trend.

In some examples, the user interface is configured to display the graphical representation of the change in the trend by compressing the graphical representation of the trend.

In some examples, the user interface is configured to display the graphical representation of the change in the trend by changing a scale of the graphical representation of the trend.

In some examples, the user interface is configured to display the graphical representation of the change in the trend by removing a portion of the graphical representation of the trend.

In some examples, the user is interface configured to display the graphical representation of the change in the trend on a second display.

In some examples, the processing system is configured to send the operational data corresponding to the graphical representation of the change in the trend to a storage system.

Also disclosed herein is a method of operating a Human-Machine Interface (HMI) system wherein the method comprises receiving operational data associated with an operation of a machine, processing the operational data associated with the operation of the machine to determine a trend in the operational data, displaying a graphical representation of the trend, receiving a first user input and a second user input simultaneously on a surface of a user interface, processing the first user input and the second user input to determine a change in the trend, and displaying a graphical representation of the change in the trend.

Also disclosed herein is a software product configured to operate a Human-Machine Interface (HMI) system. The software product comprises HMI operation software, HMI interface software, and a storage system that stores the HMI operation software and the HMI interface software. The HMI interface software is configured to direct a machine interface to receive operational data associated with an operation of a machine. The HMI operation software is configured to direct a processing system to process the operational data associated with the operation of the machine to determine a trend in the operational data. The HMI interface software is configured to direct a user interface to display a graphical representation of the trend, and receive a first user input and a second user input simultaneously on a surface of the user interface. The HMI operation software is configured to direct the processing system to process the first user input and the second user input to determine a change in the trend. The HMI interface software is configured to direct the user interface to display a graphical representation of the change in the trend.

BRIEF DESCRIPTION OF THE DRAWINGS

Many aspects of the disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the present disclosure. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views. While several embodiments are described in connection with these drawings, the disclosure is not limited to the embodiments disclosed herein. On the contrary, the intent is to cover all alternatives, modifications, and equivalents.

FIG. **1** is a block diagram illustrating an industrial environment.

FIG. **2** is a block diagram illustrating an HMI system.

FIG. **3** is a flow diagram illustrating a method of operating an industrial environment.

FIG. **4** is a display diagram illustrating an HMI system display.

FIG. **5** is a display diagram illustrating an HMI system display.

FIG. **6** is a display diagram illustrating an HMI system display.

FIG. **7** is a display diagram illustrating an HMI system display.

DETAILED DESCRIPTION

The following description and associated figures teach the best mode of the invention. For the purpose of teaching inventive principles, some conventional aspects of the best mode may be simplified or omitted. The following claims specify the scope of the invention. Note that some aspects of the best

mode may not fall within the scope of the invention as specified by the claims. Thus, those skilled in the art will appreciate variations from the best mode that fall within the scope of the invention. Those skilled in the art will appreciate that the features described below can be combined in various ways to form multiple variations of the invention. As a result, the invention is not limited to the specific examples described below, but only by the claims and their equivalents.

Described herein is a system and method for manipulating trend graphs in a Human-Machine Interface (HMI) system. An HMI system can receive status information from machines in an industrial environment and display that information in a graphical form, called trend graphs. Many operators, managers, and other workers who interact with machinery using an HMI system desire to manipulate the trend graphs for viewing the data in different ways.

Examples of possible manipulations to trend graphs include changing the scale of a graph by zooming out from a section of a trend, or by drilling down or zooming in to a section of a trend. A user may wish to rotate a trend along an x-axis, y-axis, or z-axis, or alter the rate at which the trend data is displayed. A user may desire to tag multiple points or sections along a trend. A user may wish to remove portions of a trend to view separately, or in order to view the trend without the removed portions.

In order to achieve the above described and similar manipulations, a user could, for example, utilize an HMI system incorporating a multi-touch screen capable of receiving multiple simultaneous touches from the user. Based on the multiple touches the user provided on the surface of the touch screen, the HMI system could process the touches to determine a change in the trend. The HMI system could then display the change in the trend requested by the user's touches.

FIG. **1** is a block diagram illustrating industrial environment **100**. Industrial environment **100** comprises machine systems **101-103**, Human-Machine Interface (HMI) system **104**, and communication system **105**. The number of machine systems and HMI systems shown in FIG. **1** have been restricted for clarity, but there would typically be many more. Machine systems **101-103** and HMI system **104** communicate over communication system **105**.

Industrial environment **100** includes machine systems **101-103**, HMI system **104**, and communication system **105**. Industrial environment **100** comprises an automobile manufacturing factory, food processing plant, microprocessor fabrication facility, or some other type of industrial enterprise. Machine systems **101-103** comprise pumps, motors, robots, or some other mechanical apparatus, including their associated control systems. A control system comprises, for example, a programmable logic controller (PLC). Additionally, machine systems **101-103** comprise other, non-mechanical elements, such as a brew kettle in a brewery, a reserve of coal or other resources, or any other element that may reside in an industrial environment **100**.

Machine systems **101-103** continually produce operational data over time. The operational data indicates the current status of machine systems **101-103**, such as pressure, temperature, speed, or some other status metrics. The operational data may comprise dynamic charts or trends, real-time video, or some other graphical content. Machine systems **101-103** continually transfer the operational data to HMI system **104** over communication system **105**. In addition, HMI system **104** transfers control instructions to machine systems **101-103** over communication system **105**. Communication system **105** could be a local area network, wide area network, or some other communication network—including combinations thereof.

HMI system **104** comprises computer and communication equipment and software. HMI system **104** continually receives the operational data from machine systems **101-103**. HMI system **104** processes the operational data to generate various graphical displays indicating the current and historical status of machine systems **101-103**. HMI system **104** also controls machine systems **101-103**. For example, HMI system **104** might turn on a pump, speed-up a motor, stop a robot, boil a brew kettle, or perform some other type of machine control. Then, an HMI graphical display might indicate the pressure of the pump, the speed of the motor, the output of the robot, the temperature of the brew kettle, or some other status metric. An example of an HMI system that could be adapted in accord with this description is PanelView Plus™ supplied by Rockwell Automation. Other HMI systems are possible.

FIG. **2** is a block diagram illustrating HMI system **104**. HMI system **104** comprises machine interface **201**, processing system **202**, storage system **204**, user interface **205**, and communication system **206**. User interface **205** includes display device **207**. Storage system **204** stores HMI operating software **211** and HMI interface software **212**.

Machine interface **201** comprises communication circuitry and equipment that communicates with machine systems **101-103** over communication system **105**. Processing system **202** comprises microprocessors or other logic circuitry that retrieves and executes HMI operating software **211**.

User interface **205** comprises a touch screen, a touch pad, or some other user device. Display device **207** comprises a touch screen, liquid crystal display, cathode ray tube display, or some other graphical display mechanism. It should be understood that user interface **205** and display device **207** could comprise a single element providing for all user interaction, such as a touch screen. Additionally or alternatively, user interface **205** could comprise multiple user devices and multiple display devices, including a plurality of touch screens.

Storage system **204** comprises a disk, integrated circuit, flash drive, optical media, or some other memory device. Communication system **206** comprises a bus, local area network, or some other communication apparatus. The above-described components (**201-207**) of HMI system **104** may be integrated together or distributed among multiple devices.

HMI software **211-212** comprises an application program, firmware, or some other form of machine-readable processing instructions. HMI operating software **211** may include an operating system, utilities, drivers, networking, and applications. When executed by processing system **202**, HMI software **211-212** directs HMI system **104** to operate as described herein. HMI interface software **211** comprises an application. An example of HMI interface software is RSView® supplied by Rockwell Automation. Other HMI interface software is possible.

FIG. **3** is a flow diagram illustrating a method of operating industrial environment **100**. HMI system **104** receives operational data associated with an operation of machine systems **101-103** (operation **302**). The operational data indicates the current status of machine systems **101-103**, such as pressure, temperature, speed, or some other status metrics. HMI system **104** processes the operational data to determine a trend in the operational data (operation **304**). HMI system **104** displays a graphical representation of the trend to a user (operation **306**).

The user desires to conveniently manipulate the graphical representation of the trend in the operational data. The user operates HMI system **104** to simultaneously select at least

two points on the graphical representation to provide input data to HMI system **104**. After selecting the desired points on the trend, the user may provide a motion associated with each respective point. For example, to issue a command to the HMI system, the user may select two points on the trend by placing his index fingers on a touch screen at two separate locations, and then provide a motion by dragging each finger in opposite directions. The first point on the trend that the user selects and any motion associated therewith corresponds to a first user input, and the second point on the trend that the user selects and any motion associated therewith corresponds to a second user input. HMI system **104** receives the first user input and the second user input simultaneously on the surface of user interface **205** (operation **308**). In one embodiment, user interface **205** comprises a touch screen capable of accepting multiple touches simultaneously from the user.

In response to the user selections, HMI system **104** processes the first user input and the second user input to determine a change in the trend (operation **310**). Based on the change determined in operation **310**, HMI system **104** displays a graphical representation of the change in the trend to the user (operation **312**).

It should be noted that HMI system **104** may be operated by multiple users simultaneously. In one embodiment, the first user input is provided by a first user, and the second user input is provided by a second user. In another embodiment, multiple users operate HMI system **104** by simultaneously providing distinct sets of a first user input and a second user input. Accordingly, any reference to a singular user hereinabove or hereinafter comprises a single user or a plurality of users.

HMI system **104** may perform additional operations related to the change in the trend determined in operation **310**. In one embodiment, HMI system **104** displays the graphical representation of the change in the trend on a second display. In this manner, a user may view the graphical representation of the altered trend on the second display, while continuing to monitor trends depicting current operational status data on the first display. In another embodiment, HMI system **104** sends the operational data corresponding to the graphical representation of the change in the trend to a storage system, such as storage system **204**. Under this embodiment, if the user detects an anomaly in the graphical trend data, he may send the underlying operational data to a storage system for later review.

FIG. **4** is a display diagram illustrating an HMI system **104** graphical display **401** provided by user interface **205**. Graphical display **401** depicts several graphical representations of trends corresponding to underlying operational data. The operational data indicates the current status of machine systems **101-103**, such as pressure, temperature, speed, or some other status metrics. Note that the trends depicted in graphical display **401** are illustrative and graphical display **401** does not depict an actual HMI graphical display. Also note that graphical display **401** may display more or fewer trends than the three trends depicted in graphical display **401**.

Graphical display **401** contains a y-axis, labeled "PV" for Performance Value, and an x-axis, labeled "TIME", so that performance values of one or more machine systems are plotted against time. While graphical display **401** depicts only a single pair of axes, graphical display **401** is capable of displaying a plurality of pairs of axes, each associated with a different trend graph. Moreover, graphical display **401** is not limited to plotting only performance value and time, but may plot many different criteria and may alter the scales of the axes.

The user selects a trend to manipulate by selecting at least two points on the graphical representation of the trend. After selecting the desired points on the trend, the user may provide a motion associated with each respective point. In response to the user selections, HMI system **104** processes the user inputs to determine a change in the trend, and then displays a graphical representation of the change in the trend on user interface **205**.

FIG. **5** is a display diagram illustrating an HMI system **104** graphical display **401** provided by user interface **205**. Note that the graph axes have been removed from graphical display **401** in FIG. **5**.

In this embodiment, to effect a desired change in trend **510**, a user has simultaneously selected points **502** and **504** on trend **510**. The user has also provided a horizontal motion with respect to each point **502** and **504** selected, represented by the directional arrows in graphical display **401**. The horizontal motion associated with point **502** is toward the right edge of graphical display **401**, while the horizontal motion associated with point **504** is toward the left edge of graphical display **401**. The selection of point **502** and the associated horizontal motion comprises a first user input, and the selection of point **504** and the associated horizontal motion comprises a second user input. In an example, using a touch screen, the user has placed the index finger of his left hand on point **502**, and the index finger of his right hand on point **504**, and simultaneously dragged his left index finger and his right index finger closer together in a horizontal motion.

HMI system **104** processes the first user input and the second user input to determine the desired change in the graphical representation of the trend. In this embodiment, the user has requested a compression of trend **510**. In response, HMI system **104** displays a graphical representation of trend **510** in a compressed state, depicted by trend **512**. Note that only the scale of trend **512** is altered; the scales of the other trends depicted in graphical display **401** are independent and remain unchanged. In another embodiment, all trends depicted in graphical display **401** share the same scale, so that changing the scale of one trend causes a corresponding change in scale to any other trends sharing that scale.

FIG. **6** is a display diagram illustrating an HMI system **104** graphical display **401** provided by user interface **205**. Note that the graph axes have been removed from graphical display **401** in FIG. **6**.

In this embodiment, to cause a desired change in trend **610**, a user has simultaneously selected points **602** and **604** on trend **610**. The user has also provided a horizontal motion with respect to each point **602** and **604** selected, represented by the directional arrows in graphical display **401**. The horizontal motion associated with point **602** is toward the left edge of graphical display **401**, while the horizontal motion associated with point **604** is toward the right edge of graphical display **401**. The selection of point **602** and the associated horizontal motion comprises a first user input, and the selection of point **604** and the associated horizontal motion comprises a second user input. In an example, using a touch screen, the user has placed the index finger of his left hand on point **602**, and the index finger of his right hand on point **604**, and simultaneously dragged his left index finger and his right index finger farther apart in a horizontal motion.

HMI system **104** processes the first user input and the second user input to determine the desired change in the graphical representation of the trend. In this embodiment, the user has requested an expansion of trend **610**. In response, HMI system **104** displays a graphical representation of trend **610** in an expanded state, depicted by trend **612**. Note that only the scale of trend **612** is altered; the scales of the other trends depicted in graphical display **401** are independent and remain unchanged.

FIG. **7** is a display diagram illustrating an HMI system **104** graphical display **401** provided by user interface **205**. Note that the graph axes of graphical display **401** in FIG. **7** are a different scale than the graph axes of graphical display **401** in FIG. **4**.

In this embodiment, to effect a desired change in trend **710**, a user has simultaneously selected points **702** and **704** on trend **710**. The user has also provided a horizontal motion with respect to each point **702** and **704** selected, represented by the directional arrows in graphical display **401**. The horizontal motion associated with point **702** is toward the right edge of graphical display **401**, while the horizontal motion associated with point **704** is toward the left edge of graphical display **401**. The selection of point **702** and the associated horizontal motion comprises a first user input, and the selection of point **704** and the associated horizontal motion comprises a second user input. In an example, using a touch screen, the user has placed the index finger of his left hand on point **702**, and the index finger of his right hand on point **704**, and simultaneously dragged his left index finger and his right index finger closer together in a horizontal motion, until both fingers were touching.

HMI system **104** processes the first user input and the second user input to determine the desired change in the graphical representation of the trend. In this embodiment, the user has requested a compression of trend **710**. In response, HMI system **104** displays a graphical representation of trend **710** in a compressed state, depicted by trend **712**. In effect, the user has requested to remove the portion of trend **710** between points **702** and **704**, resulting in a modified trend **712** that only includes the portion of trend **710** to the left of point **702** and to the right of point **704**. Note that the "TIME" scale of the x-axis changes when trend **712** is displayed, indicating that the trend between time units **3** and **6** are hidden from view. Also note that additional portions of trend **712** are now displayed, represented by the portions of trend **712** visible at time units less than 1 and time units greater than 8.

In another example, a user could achieve the opposite effect by applying outward momentum from points **702** and **704**. For example, by dragging his index fingers in a horizontal motion from points **702** and **704** to the edges of graphical display **401**, the user could expand trend **710** so that only the portion between **702** and **704** is visible.

Advantageously, a user is able to easily manipulate any graphical representation of a trend displayed on an HMI system **104** graphical display, such as graphical display **401**. HMI system **104** can alter a time scale of a graphical representation of a trend, and display a graphical representation of a change in the trend with the altered time scale. For example, by using multiple touches on a touch screen, a user may effectively change the scale of a graphical representation of a trend by zooming out from a section of a trend. Likewise, the user may effectively change the scale of a graphical representation of a trend by drilling down or zooming in to a section of a trend.

In another example, the user may rotate a trend along an x-axis, y-axis, or z-axis. The user may alter the speed of the graphically displayed incoming operational data by either slowing down or speeding up the rate at which the trend data is displayed. The user may tag multiple points or sections along a trend. The user may remove portions of a trend to view separately, or in order to view the trend without the removed portions. The user may also scroll backward in time to view recently displayed or historical data. The user can then scroll forward in time to return to a display of the presently incoming operational data. In addition, the user can scroll through multiple trends simultaneously. For example, the user may scroll backward in time on a first trend and forward in time on a second trend.

In another example, a user may combine two trends to compare the effect a variable of one trend has on a variable of another. For example, a first trend may depict the energy used by a machine over time, and a second trend may depict the operating temperature of the machine over time. A user could then touch the first trend and the second trend and pull them together, creating a third trend depicting the effect the operating temperature of the machine has on the amount of energy used by the machine. For example, the third trend may indicate that as the operating temperature increases, the machine uses more energy.

The above description and associated drawings teach the best mode of the invention. The following claims specify the scope of the invention. Some aspects of the best mode may not fall within the scope of the invention as specified by the claims. Also, while the preceding discussion describes embodiments employed specifically in conjunction with the monitoring and analysis of industrial processes, other applications, such as the mathematical modeling or monitoring of any man-made or naturally-existing system, may benefit from use of the concepts discussed above. Further, those skilled in the art will appreciate that the features described above can be combined in various ways to form multiple variations of the invention. As a result, the invention is not limited to the specific embodiments described above, but only by the following claims and their equivalents.

What is claimed is:

1. A method of operating a Human-Machine Interface (HMI) system, the method comprising:
- receiving operational data associated with an operation of a machine;
- processing the operational data associated with the operation of the machine to determine a trend in the operational data;
- displaying a graphical representation of the trend;
- receiving a first user input and a second user input simultaneously on a surface of a user interface;
- processing the first user input and the second user input to determine a change in the trend; and
- displaying a graphical representation of the change in the trend.

2. The method of claim **1** wherein displaying the graphical representation of the change in the trend comprises expanding the graphical representation of the trend.

3. The method of claim **1** wherein displaying the graphical representation of the change in the trend comprises compressing the graphical representation of the trend.

4. The method of claim **1** wherein displaying the graphical representation of the change in the trend comprises changing a scale of the graphical representation of the trend.

5. The method of claim **1** wherein displaying the graphical representation of the change in the trend comprises removing a portion of the graphical representation of the trend.

6. The method of claim **1** further comprising displaying the graphical representation of the change in the trend on a second display.

7. The method of claim **1** further comprising sending the operational data corresponding to the graphical representation of the change in the trend to a storage system.

8. A Human-Machine Interface (HMI) system comprising:
- a machine interface configured to receive operational data associated with an operation of a machine;

a processing system configured to process the operational data associated with the operation of the machine to determine a trend in the operational data;

a user interface configured to display a graphical representation of the trend, and receive a first user input and a second user input simultaneously on a surface of the user interface;

the processing system configured to process the first user input and the second user input to determine a change in the trend; and

the user interface configured to display a graphical representation of the change in the trend.

9. The HMI system of claim **8** wherein the user interface is configured to display the graphical representation of the change in the trend by expanding the graphical representation of the trend.

10. The HMI system of claim **8** wherein the user interface is configured to display the graphical representation of the change in the trend by compressing the graphical representation of the trend.

11. The HMI system of claim **8** wherein the user interface is configured to display the graphical representation of the change in the trend by changing a scale of the graphical representation of the trend.

12. The HMI system of claim **8** wherein the user interface is configured to display the graphical representation of the change in the trend by removing a portion of the graphical representation of the trend.

13. The HMI system of claim **8** wherein the user is interface configured to display the graphical representation of the change in the trend on a second display.

14. The HMI system of claim **8** wherein the processing system is configured to send the operational data corresponding to the graphical representation of the change in the trend to a storage system.

15. A software product configured to operate a Human-Machine Interface (HMI) system, the software product comprising:

HMI interface software configured to direct a machine interface to receive operational data associated with an operation of a machine;

HMI operation software configured to direct a processing system to process the operational data associated with the operation of the machine to determine a trend in the operational data;

the HMI interface software configured to direct a user interface to display a graphical representation of the trend, and receive a first user input and a second user input simultaneously on a surface of the user interface;

the HMI operation software configured to direct the processing system to process the first user input and the second user input to determine a change in the trend;

the HMI interface software configured to direct the user interface to display a graphical representation of the change in the trend; and

a storage system that stores the HMI operation software and the HMI interface software.

16. The software product of claim **15** wherein the HMI interface software is configured to direct the user interface to display the graphical representation of the change in the trend by expanding the graphical representation of the trend.

17. The software product of claim **15** wherein the HMI interface software is configured to direct the user interface to display the graphical representation of the change in the trend by compressing the graphical representation of the trend.

18. The software product of claim **15** wherein the HMI interface software is configured to direct the user interface to display the graphical representation of the change in the trend by changing a scale of the graphical representation of the trend.

19. The software product of claim **15** wherein the HMI interface software is configured to direct the user interface to display the graphical representation of the change in the trend by removing a portion of the graphical representation of the trend.

20. The software product of claim **15** wherein the HMI interface software is configured to direct the user interface to display the graphical representation of the change in the trend on a second display.

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